

Missouri Department of Natural Resources  
**Total Maximum Daily Load Information Sheet**

## Little Lindley Creek

### Water Body Segment at a Glance:

**County:** Dallas  
**Nearby Cities:** Buffalo  
**Length of impairment:** 1 mile  
**Pollutants:** Biochemical Oxygen Demand (BOD)  
Volatile Suspended Solids (VSS)  
**Source:** Buffalo Wastewater Treatment Plant  
(WWTP)



**TMDL Priority Ranking:** High

### Description of the Problem

#### Beneficial uses of Little Lindley Creek

- Livestock and Wildlife Watering
- Protection of Warm Water Aquatic Life
- Human Health Protection (Fish Consumption)

#### Use that is impaired

- Protection of Warm Water Aquatic Life

#### Standards that apply

- The Missouri Water Quality Standard (WQS), found in 10 CSR 20-7.031 Table A, for Dissolved Oxygen (DO) (related to BOD) in streams is 5.0 mg/L (milligrams per liter or parts per million).
- Standards for VSS may be found in the general criteria section of the WQS, 10 CSR 20-7.031(3)(A) and (C) where it states:
  - Waters shall be free from substances in sufficient amounts to cause the formation of putrescent, unsightly or harmful bottom deposits or prevent full maintenance of beneficial uses.
  - Waters shall be free from substances in sufficient amounts to cause unsightly color or turbidity, offensive odor or prevent full maintenance of beneficial uses.

### Background Information and Water Quality Data

Any waterbody that was listed for Non-Filterable Residue (NFR) in 1998, like Little Lindley Creek, is now being listed as VSS. This change was made to better distinguish between organic solids

(like sludge and algae) coming from WWTPs (VSS) and mineral solids (soil or mineral particles) coming from soil erosion or erosion of mine waste materials or stockpiles, Non-Volatile Suspended Solids (NVSS). Sludge deposits have been noted in the stream below the Buffalo WWTP since 1993. Sludge (VSS) can settle onto the bottom of a stream smothering natural substrates (materials in the streambed), aquatic invertebrate animals and fish eggs. Sludge also can hold nutrients that will be released in the stream and encourage the growth of algae. While algae, as an aquatic plant, can be an important food source and provides additional oxygen, an overproduction of algae will result in die off. Oxygen is required for decomposition of the dead algae. In addition, algae do not photosynthesize at night; they respire and use oxygen, further decreasing the available DO in the stream.

Like all wastewater discharges in Missouri, the Buffalo WWTP must meet the requirements of a discharge permit issued by the Missouri Department of Natural Resources. Limits for BOD and Total Suspended Solids are included in the permit. The city of Buffalo upgraded its WWTP in 2001 to reduce BOD and VSS in the stream.

The department conducted water quality and aquatic invertebrate studies of the creek in 2002 and 2003. These studies showed that there is still reduced diversity of aquatic invertebrates.

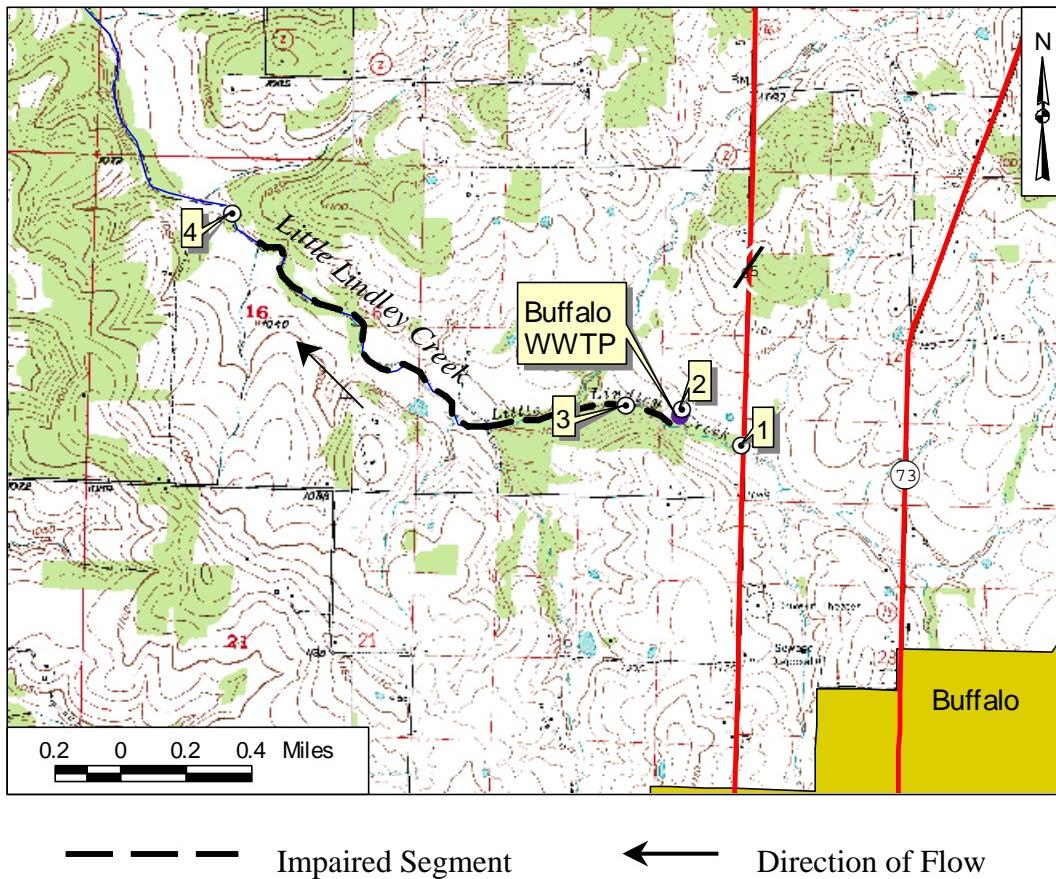
Department staff observed sludge in the creek during several visits to the WWTP in 2005. The WWTP does not have adequate sludge holding capacity and sludge is released to the creek during heavy rain events. Sludge that is washed into the creek can be responsible for loss of habitat for macroinvertebrates. The studies also showed a large increase in nitrogen and phosphorus in Little Lindley Creek downstream of the WWTP. There is a poultry processor in Buffalo that is a source of high BOD and nutrients to the WWTP system. The city of Buffalo has implemented operational controls to reduce sludge releases and limit the poultry processor's discharge to the system to improve effluent quality. In addition, the permit has been modified to require construction of improvements to the sludge storage and handling facilities at the plant. The department plans to submit Buffalo's permit in lieu of a TMDL early in 2007.

| <b>Mean (Average) Data from Little Lindley Creek Water Quality Studies, July and September 2003</b> |   |              |                 |                 |                  |                       |                    |
|---|---|--------------|-----------------|-----------------|------------------|-----------------------|--------------------|
| <b>Site #</b>   | <b>Site Description</b>                   | <b>Am DO</b> | <b>TSS mg/L</b> | <b>VSS mg/L</b> | <b>CBOD mg/L</b> | <b>Nitrate-N mg/L</b> | <b>T Phos mg/L</b> |
| 1   | Little Lindley Creek 0.2 mile above WWTP  | 2.8          | 5.8             | 2.9             | 0.99             | 0.04                  | 0.06               |
| 2   | Buffalo WWTP                              | 4.9          | 4.7             | 3.3             | 1.82             | 40.87                 | 5.97               |
| 3   | Little Lindley Creek 0.1 mile below WWTP  | 5.0          | 9.2             | 4.2             | 0.99             | 36.82                 | 5.39               |
| 4   | Little Lindley Creek 1.8 miles below WWTP | 6.5          | 3.1             | 2.8             | 0.99             | 25.12                 | 2.85               |
| Off Map   | Little Lindley Creek 3.1 miles below WWTP | 5.1          | 4.9             | 2.5             | 0.99             | 15.08                 | 1.54               |

Readings of 0.99 indicate that BOD was not detectable.

A map of the sampling sites may be found on the next page.

## Little Lindley Creek in Dallas County, Missouri, with Sampling Sites



| Site number           | Site Description                          |
|-----------------------|---|
| Site #1               | Little Lindley Creek 0.2 mile above WWTP  |
| Site #2               | Buffalo WWTP                              |
| Site #3               | Little Lindley Creek 0.1 mile below WWTP  |
| Site #4               | Little Lindley Creek 1.8 miles below WWTP |
| Site #5 (off the map) | Little Lindley Creek 3.1 miles below WWTP |

### For more information call or write:

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